

Appl. No. 10/808,721  
Amdt. dated June 9, 2005  
Reply to Office Action of January 11, 2005

PATENT

**Amendments to the Drawings:**

The attached sheet of drawings includes changes to Fig. 1. This sheet, which includes Fig.1 replaces the original sheet including Fig. 1.

Attachment: Replacement Sheet  
Annotated Sheet Showing Changes

**REMARKS/ARGUMENTS**

Upon entry of this amendment, claims 1-20 will be pending in this application and presented for examination. Claims 7 and 16 were amended to more distinctly claim the invention. Support for the amended claims can be found in the specification. No new matter has been added. Reconsideration is respectfully requested.

**Claims Rejected Under 35 U.S.C. § 103**

Claims 1-20 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Hodges (U.S. Patent No. 4,200,863) in view of Lee (U.S. Patent No. 5,416,485). Applicant respectfully traverses all the Examiner's rejections.

**A. Claim 1**

**Lack of Motivation to Combine Hodges and Lee**

The proposed modification to Hodges using Lee would render Hodges unsatisfactory for its intended purpose and change its principle of operation. Hence there is no suggestion or motivation to make the proposed modification. (MPEP, §2143.01).

The Examiner conceded that Hodges fails to teach that the plurality of resistors have substantially equal value, the capacitance of the capacitors have the same capacitance, and an operational amplifier. (Office Action mailed Jan. 11, 2005, page 4). But the Examiner asserted that it would have been obvious to one having ordinary skill in the art to modify the converter of Hodges by substituting the equal value resistors and equal value capacitance as taught by Lee to improve performance and accuracy in SAR analog to digital converter. (Office Action mailed Jan. 11, 2005, pages 4-5).

These proposed modifications would render the converter of Hodges unsatisfactory for its intended purpose and change its principle of operation. The converter of Hodges is intended for "analog/digital conversion." (Hodges, col. 1, lines 18-24). The operation principle of the converter is described, for example, in Figures 3 and 4. Specifically, "FIG. 3 is a timing diagram showing a typical example of successive approximation accomplished by the

embodiments of FIGS. 1 and 2,” and “FIG. 4 is a chart showing the positions of the switches of FIG. 2 in sequence for obtaining the timing diagram of FIG. 3.” (Hodges, col. 2, lines 56-61). Hodges also states that “[w]ith the embodiment of FIG. 18, the conversion process initially proceeds in the manner described above with reference to FIG. 2.” (Hodges, col. 14, lines 20-22).

As shown in Figures 3 and 4, the converter of Hodges appears to rely on differences in capacitance for analog/digital conversion. “[T]he capacitor representing the most significant bit is marked C and that representing the least significant bit is marked C/8” in Figure 2. (Hodges, col. 4, lines 7-10). Making the capacitance values equal would render the converter of Hodges unsatisfactory for analog/digital conversion and change the operation principle of the converter as shown in Figures 3 and 4.

For example,  $V_X$  has different values during  $t_5-t_4$  and  $t_7-t_6$ .  $V_X$  equals  $-V_{IN}+V_{REF}/2$  for  $t_5-t_4$ , and  $-V_{IN}+V_{REF}/4$  for  $t_7-t_6$ . This  $V_X$  difference appears to result from different capacitance values and different switch positions for S2 and S3. As shown in Figure 2, the capacitor connected to S2 has a capacitance value of C, and in contrast the capacitor connected to S3 has a capacitance value of C/2. During  $t_5-t_4$ , S2 is placed in position 2 and S3 is placed in position 1. In contrast, during  $t_7-t_6$ , S2 is placed in position 1 and S3 is placed in position 2.

If the capacitor connected to S2 and the capacitor connected to S3 were modified to have the same capacitance value, switching S2 from position 2 to position 1 and switching S3 from position 1 to position 2 would not have changed the values of  $V_X$ . Consequently, the capacitor array 11 would have not been able to “produce[] a successive approximation signal  $V_X$  which is connected to a comparator 12” as shown in Figures 3 and 4. (Hodges, col. 3, lines 41-43).

Hence the proposed modification to the converter of Hodges by substituting the equal value resistors and equal value capacitance as taught by Lee would render the converter of Hodges unsatisfactory for its intended purpose and change its principle of operation. Accordingly, one of ordinary skill would not have combined Hodges and Lee. Therefore Applicant respectfully requests withdrawal of the rejections of the pending claims.

**Failure of Hodges and Lee to Teach or Suggest “each ...  
capable of being coupled to anyone of the first voltage, an  
analog voltage, a second voltage, and a third voltage”**

Hodges and Lee, even if combined, fail to disclose or suggest all limitations of claim 1. More particularly, claim 1 recites “wherein each of the second capacitor terminal, the fourth capacitor terminal, and the sixth capacitor terminal is capable of being coupled to anyone of the first voltage, an analog voltage, a second voltage, and a third voltage.” (Applicant’s claim 1, emphasis added). Hodges and Lee, even if combined, fail to disclose or suggest these claim limitations.

The Examiner asserted that the second terminals (two, four, six...) of the capacitor are connected to receive either a first voltage which is a ground voltage that is also connected to a second input of the operational amplifier, a reference or second voltage, an analog voltage ( $V_{in}$ ) associated with an analog signal, a third voltage. (Office Action mailed Jan. 11, 2005, page 3). Additionally, the Examiner stated that the third voltage originates from a resistor string that comprises a plurality of resistors serially connected. (Office Action mailed Jan. 11, 2005, page 3). But as shown in Figure 18, the voltage provided by a resistor string appears available for only one capacitor. Furthermore, Hodges states that “[w]hen the last bit decision obtainable with the capacitor array is completed, the resistor string is used to apply fractions of  $V_{REF}$  to the bottom plate of the smallest capacitor  $C/8$ .” (Hodges, col. 14, lines 22-25).

Hence Hodges does not disclose or suggest each of the second capacitor terminal, the fourth capacitor terminal, and the sixth capacitor terminal is capable of being coupled to anyone of the first voltage, an analog voltage, a second voltage, and a third voltage.

Accordingly, claim 1 is asserted to be allowable for at least the above reasons.

**B. Remaining Claims**

In light of the above, claims 2-20 are allowable for substantially the same reason as claim 1, and more particularly for the specific features they recite.

Claims Rejected Under 35 U.S.C. § 112

Claims 7-11 and 16-20 stand rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A. Claim 7-11

The Examiner asserted that in claim 7, lines 1-2, the term “the plurality of capacitor terminals is free from the first capacitor terminal and the third capacitor terminal” is confusing and unclear. (Office Action mailed Jan. 11, 2005, page 2). Applicant respectfully traverses the Examiner’s rejection. But in order to expedite prosecution of the above identified application, Applicant has amended claim 7 and respectfully submits that the rejections of claims 7-11 should be withdrawn.

B. Claim 16-20

The Examiner asserted that in claim 16, the term “adjusting the each of the second plurality of capacitors terminals to one selected ...” is confusing, and it is not clear how the fourth voltage could be adjusted by this process. (Office Action mailed Jan. 11, 2005, pages 2-3). In response, Applicant has amended claim 16 based on at least the Examiner’s suggestion, and respectfully submits that the rejections of claims 16-20 should be withdrawn.

Drawings

Applicant has added “Prior Art” to Figure 1, and respectfully submits that the objection to Figure 1 has been overcome.

Priority

Applicant has submitted a certified copy of the Chinese Application No. 200410017099.2.

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CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 650-326-2400.

Respectfully submitted,



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## Prior Art